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RESEARCH ARTICLE

PLANT INSECT INTERACTION AND CROP PROTECTION: A DYNAMIC ANALYSIS

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ABSTRACT

Integrating supporting and regulating ecosystem functions provided by several components of biodiversity into cropping systems has been prepared as a promising way to decrease agrochemical inputs and negative environmental impacts while maximizing crop productivity and food security. The co-evolution of plants and insects in very intriguing and plays vital role in the crop protection. Plants have developed efficient mechanisms to protect them against herbivore while insects have found diverse ways of avoiding negative effects of their host plant defense mechanism. Even though many workers have attempted to study plant - insect interaction, still our knowledge is limited. A changing climate, growing pest have given uncertain impacts on crop protection so, the present study address the key question that Is it possible to find alternative to meet these challenges by studying the plant-insect interaction and formulating integrated pest management? The study was conducted at Dharapuram, Dindugal district as this area is riched with the variety of crop cultivation. The study concludes that the biological control of insect pests with natural products by the development of new plant varieties with enhanced chemical defenses should be followed for the better crop protection.

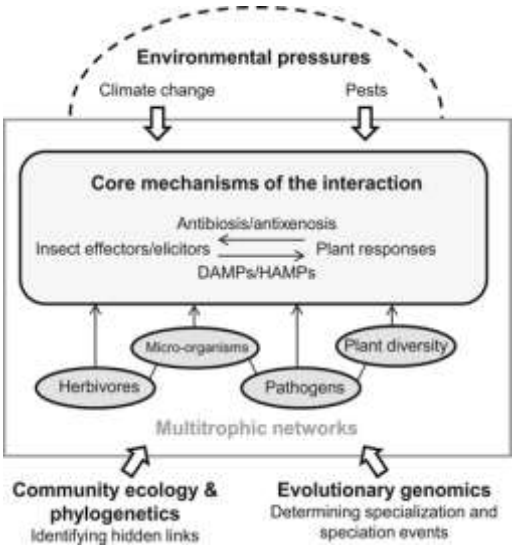
Keywords: Insect, Crop protection, Interaction, Biological control.

1. INTRODUCTION

In nature, most plants are fed upon by insects. Some herbivorous insects are very particular in their choice of food plants, whereas others are more generalist feeders. Plants are not passive by standers, however, as they have evolved resistance to most potential insect attackers (1). The world is mostly green. Domesticated crops are also inherently resistant to most insects (2). although we are sensitive to any insect damage that reduces yield, quality and profits to the farmer, and certain insects can indeed devastate their crop host leaving nothing to harvest. The ancestors of modern-day crop plants coevolved with insects and through natural selection accumulated many physical and chemical traits that formed a core defense against attackers (3) . Plant domestication and breeding involving selection for improved yield and quality has generally made crops more susceptible to pest damage (4).

The co-evolution of plants and insects is very intriguing. Plants have developed efficient mechanisms to protect them against herbivory while insects have found diverse ways of avoiding negative effects of their host plants defense mechanisms (4,5). The better understanding of this process will allow us to achieve more effective methods for the biological control of insect pests with natural products by the development of new plant varieties with enhanced chemical defenses (6).

Current investigations of plant–insect interactions hold promise for us to gain a better understanding of the functional, ecological, and evolutionary impacts of insect–plant interactions, with implications and relevance for both applied and fundamental research (7,8).



Promises and challenges in insect-plant interaction. Damage-Associated Molecular Patterns (DAMPs); Herbivore-Associated Molecular Patterns (HAMPs)

Over the coming years, a changing climate, growing pest have given uncertain impacts on crop

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protection so, is it possible to find alternative to meet these challenges by studying the plant-insect interaction and formulating integrated pest management? To address these issues, the main objective of this study is to screening of insects for a ten high yielding plants and to study its impact over it to find the alternative for high yield.

2. MATERIALS AND METHODS

The present study was carried out from august 2018 to January 2019 in. The insect pests were indentified up to family/genus/species levels wherever possible. The host plants also were identified. The insect pests in the field were recognized and observed by using mobile camera, And also by the picture downloaded from the website. During the study insect pests were identified also classified according to their family. And also the plant part attacked by insect pest.

AREA OF STUDY:

- The study was conducted at Dharapuram, Dindugal district.
- The local farm of 7 acres with various plantation is selected and the pests were identified.
- The interaction of insect with plants was observed externaly.
- The damage caused by the insect was noticed and finding the alternate for the better yield of the host plant.

3. RESULTS

Table 1. Screened insects with their host plant

	HOST PLANT	PEST	PART OF ATTACK	ORDER AND FAMILY
1	Coconut (*Cocos nucefera*)	*Oryetes rhinoceros*	Tender crown	Coleoptera Scarabaeidae
2	Paddy (*Oriyza sativa*)	*Leptocorisa acuta*	Flowers and leaves	Hemiptera Alydidae
3	Sugarcane (*Saccharum* sp.)	*Chilo infuscatellus*	leaves	Lepidoptera Crambidae
4	Brinjal (*Solanum melongena*)	*Leucinodes orbanalis guen*	Fruit and shoot	Lepidoptera Crambidae
5	Ground nut (*Arachis hypogaea*)	*Aphis craccivora* koch	shoot	Hemiptera Alydidae
6.	Cotton (*Gossypium* sp.)	*Dysdercus cingulatus*	Flower and seeds	Hemiptera Pyrrhocoridae
7.	Drumstick (*Moringa oleifera*)	*Noorda moringae*	Flowers and Buds	Lepidoptera Crambidae
8.	Mango (*Mangifera indica*)	*Orthaga euadrusalis*	Tender shoot and leaves	Lepidoptera Pyralidae
9.	Sorghum (*Sorghum bicolor*)	*Chinavia hilaris*	Leaves and shoot	Hemiptera Pentatomidae
10.	Corn (*Zea mays*)	*Agrotis segetum*	Leaf, Bud and Stem	Lepidoptera Owlet moths

COCONUT PEST

- PEST COMMON NAME: Rhinoceros Beetle
- SCIENTIFIC NAME: *Oryetes rhinoceros*
- The rhinoceros beetle, well known for their unique shapes and large size, is one of the major pest of the coconut.
- It burrows the tender crown leaving behind the series of holes in the leaflets.

Fig. 1. *Oryetes rhinoceros*

PADDY PEST

- PEST COMMON NAME: Rice ear head bug.
- SCIENTIFIC NAME: *Leptocorisa acuta*
- This pest attacks during the flowering stages of the rice crop.
- It is distributed in Australia and south Asian countries.
- The excessive feeding reduces the rate of photosynthesis and cause the discoloration of the grains which reduces the market quality.

Fig. 2. *Leptocoris aacuta*

SUGARCANE PEST

- PEST COMMON NAME: yellow top borer
- SCIENTIFIC NAME: *Chiloinfus catellus*
- The pest belongs to moth family & attacks 1-3 month old crops.
- Widely distributed in south Asian countries.
- The larva feeds on the midrib and cause "death heats", which makes the central leaf sheath dry.

Fig 3. *Chiloinfus catellus*

BRINJAL PEST

- PEST COMMON NAME: Root borer
- SCIENTIFIC NAME: *Leucinodes orbanaliguen*
- It is the most serious pest of Brinjal & it is found throughout the country.
- The larve bores into tender shoots in the early stage & cause "dead hearts".
- It also attacks the buds & developing fruits.

Fig. 4. *Leucinodes orbanalisguen*

GROUNDNUT PEST

- PEST COMMON NAME : Aphids
- SCIENTIFIC NAME: *Aphis craccivora* koch

- They are the black species of aphids attacking the leguminous crops.
- They are present in large number and completely drain the plant sap.
- Due to the mass attack, the plant succumbs quickly then the larger plants.
- It also the vector of the virus that cause rosette disease of groundnut.

Fig. 5. *Aphidoidea*

COTTON PEST

- PEST COMMON NAME :Red cotton bug
- SCIENTIFIC NAME : *Dysdercus cingulatus*
- Like other true bugs,Dysdercus cingulatus also has the piercing and sucking type of mouth.
- The part of the cotton plant affected by this pest is the flower and seeds capsule or boll.
- As this develops,the insect thrusts its rostrum between the carpel s and sucks fluids from the still soft seeds inside.
- Apart from the cotton, Ladies Finger also acts as the hast plant for this bug.

Fig. 6. *Dysdercus cingulatus*

DRUMSTICK PEST

- PEST COMMON NAME :Bud worm of drumstick
- SCIENTIFIC NAME : *Noorda moringae*
- Adult is small in size with dark brown fore wings and white hind wings with dark brown border.
- Oval creamy white eggs in clusters or singly on flower buds.
- Caterpillars are dirty brown with a prominent mid-dorsal stripe and black head and pro-thoracic shield.
- Destructive and specific pest of drumstick in South India.
- Larva bores into flowers buds and causes shedding

Fig. 7. *Noorda moringae*

MANGO PEST

- PEST COMMON NAME : Leaf webber
- SCIENTIFIC NAME: *Orthaga euadrusalis*
- The caterpillars feed on the leaf surfsce by gregariously srappuing and later they make the web of the tender shoots and leaves and feed within.
- Several caterpillars may be found in a single webbed up cluster of leaves.
- The male is slightly smaller than the female.

Fig. 8. Leaf Webber

SORGHUM PEST

- PEST COMMON NAME: Stink Bug

- SCIENTIFIC NAME: *Chinavia hilaris*
- The abdomen is made of scutellum, giving the family name "Shield Bug".
- It causes the wide spread damages in many vegetables and fruits, especially in sorghum.
- It mainly affects the leaves and shoot of the plant.
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Fig. 9. Stink bug

CORN PEST

- PEST COMMON NAME: Cut worm
- SCIENTIFIC NAME: *Agrotis segetum*
- The term cutworm mainly applies to larvae of various species in the Nocutidae, a large family of moths.
- They are the voracious leaf, bud and stem feeders and can destroy entire plants
- Cutworms are not worms, biologically speaking they are caterpillars.

Fig.10. Cut Worm

4. DISCUSSION

The study of plant - insect interaction continues to be an exciting and fast moving field that build upon the more extensive literature available in plant insect interaction and offers new and significant insights into both unique molecular determinants of plant-insect interactions and the wider ecological context.

Global change is resetting the spatial and ecological equilibrium of complex co- evolutionary relationships between plants and their insect's herbivores (9). We distinguish between the direct effect of global changes on each partner's from indirect impacts on insects via the response of plants. The indirect effects include a change in the nutritional quality of the plant tissues for herbivore insects as well as changes in the microclimatic condition at the leaf surface (10).

Pollinators are involved in a close symbiotic relationship with their favourite. Plants and any depression caused by climate stress lead to pollination deficit. Pollinators are indeed quite sensitive to global changes, furthermore, although species are connected by trophies links, but species respond differently to global changes (11).

REFERENCES

1. Mescher, M.C., and C.M. De Moraes, (2015). Role of plant sensory perception in plant–animal interactions. *J. Exp. Bot.* **66**: 425-433.
2. Bruce, T.J.A. (2015). Interplay between insects and plants: dynamic and complex interactions that have coevolved over millions of years but act in milliseconds. *J. Exp. Bot.* **66**: 455-465.
3. Sugio, A., G. Dubreuil, D. Giron and J-C. Simon, (2015. Plant–insect interactions under bacterial influence: ecological implications and underlying mechanisms. *J. Exp. Bot.* **66**: 467-478.
4. Kerchev, P.I., B. Fenton, C.H. Foyer and R.D. Hancock, (2012). Plant responses to insect herbivory: interactions between photosynthesis, reactive oxygen species and hormonal signalling pathways. *Plant Cell Environ.* **35**: 441-453.
5. Harris, M.O., T.L. Friesen, S.S. Xu, M.S., D. Chen and J. Giron Stuart, (2015). Pivoting from Arabidopsis to wheat to understand how agricultural plants integrate responses to biotic stress. *J. Exp. Bot.* **66**: 513–531.
6. Rasmann, S., T.G. Köllner, J. Degenhardt, I. Hiltpold, S. Toepfer, U. Kuhlmann, J. Gershenzon, and T.C.J. Turlings (2005). Recruitment of entomopathogenic nematodes by insect-damaged maize roots. *Nature* **434**: 732–737.

7. Hiltpold, I., G. Jaffuel and T.C.J. Turlings, (2015). The dual effects of root-cap exudates on nematodes: from quiescence in plant-parasitic nematodes to frenzy in entomopathogenic nematodes. . *J. Exp. Bot.* **66**: 603–611.
8. Ryalls, J.M.W., B.D. Moore, M. Riegler, A.N. Gherlenda and S.N. Johnson, (2015). Amino acid-mediated impacts of elevated carbon dioxide and simulated root herbivory on aphids are neutralized by increased air temperatures. . *J. Exp. Bot.* **66**: 613–623.
9. Panda, N., and G.S. Khush, (1995). Host plant resistance to insects. CAB International, Wallingford.
10. Nishida, R., (2002). Sequestration of defensive substances from plants by lepidoptera. *Annu. Rev. Entomol.* **47**: 57-92.
11. Bernays, E.A., (2001). Neural limitations in phytophagous insects: Implications for diet breadth and evolution of host affiliation. *Annu. Rev. Entomol.* **46**: 703-727.